

REMARKS**Rejections under 35 U.S.C. § 103(a)**

Claims 1-6 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Kuhara et al. (U.S. Patent No. 5,542,018) (hereinafter "Kuhara") in view of Jung et al. (U.S. Pat. Pub. No. 2003/0197855) (hereinafter "Jung"). These rejections are respectfully traversed for at least the following reasons.

Applicants respectfully submit that, in the disclosure of Kuhara, an opening of a light entrance portion is not formed in the substrate 11 in Fig. 3, even though a semiconductor crystal layer 12 and a first region 13 are formed in the substrate 11. Applicants respectfully submit that Kuhara does not disclose any such openings, even though the Examiner points out Fig. 2 and column 5, lines 43-47 of Kuhara in this regard. As a result, the rejection in the Office Action is based on a factual misconception of the disclosure of Kuhara.

Applicants respectfully submit that because such an opening is not formed in the substrate 11, a carrier capturing portion such as that disclosed in the instant application's invention is not necessary in the disclosure of Kuhara. As a result, Applicants respectfully submit that a carrier capturing portion is not formed in the substrate 11 of Kuhara.

Instead, Kuhara only discloses that a photocurrent is generated by light that is radiated to the pn junction as the light detecting region. See, col. 5, lines 34-36 of Kuhara. Applicants respectfully submit that it is evident that Kuhara does not disclose, or even suggest, a carrier capturing portion capturing carriers that are generated between a photodetecting element array and a light entrance portion, as specifically recited in the claims of the instant application.

Applicants respectfully submit that Kuhara discloses that a photodiode chip includes a region for capturing unnecessary carriers. See col. 10, lines 6-8 of Kuhara. However, Applicants respectfully submit that Kuhara does not provide any disclosure or suggestion of

where such a region is formed. On the other hand, the carrier capturing portion that is included in the advantageous combinations of features described in the claims of the instant application is specifically claimed as being disposed between the photodetecting element array and the light entrance portion. Applicants respectfully submit that the additionally applied reference to Jung does not cure the above-described deficiencies of Kuhara.

Accordingly, Applicants respectfully assert that the rejections under 35 U.S.C. § 103(a) should be withdrawn because Kuhara and Jung, whether taken separately or combined, do not teach or suggest each feature of independent claim 1 of the instant application. As pointed out by MPEP § 2143.03, “[a]ll words in a claim must be considered in judging the patentability of that claim against the prior art.” In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).” Since the prior art does not disclose or suggest any of the combinations recited in Applicants’ claims, and if anything appears to teach away from the current claim recitations, KSR Int’l Co. v. Teleflex Inc., 127 S.Ct. 1727 (2007), Applicants submit that such recited combinations would not have been obvious in view of the applied references of record, whether taken alone or combined in the manner suggested by the Examiner in the Office Action.

Furthermore, Applicants respectfully assert that the dependent claims 2-6 are allowable at least because of their dependence from independent claim 1, and the reasons discussed previously.

With regard to dependent claim 6, Applicants respectfully submit that a light entrance portion is formed in a photodetector itself. A photodetecting element array and a light entrance portion are formed on the same substrate. As a result, Applicants respectfully submit that the spectrometer can be positioned at a good precision and a simple arrangement of the spectrometer can be obtained. Detailed descriptions are provided in paragraphs [0061]-[0066] of the specification of the instant application shown below.

[0061] Effects of the spectrometer according to the present embodiment shall now be described.

[0062] The spectrometer shown in FIG. 6 and FIG. 7 is arranged using the photodetector 1B of the above-described arrangement wherein the photodiode array 11 and the light entrance portion 13 are disposed on the same substrate 10. A spectrometer, of a simple arrangement with which the spectrometer components of the photodiode array 11 and the light entrance portion 13 are positioned at good precision, can thus be obtained. Also, with this arrangement, a step of aligning and fixing the photodiode array 11 and the light entrance portion 13 with respect to each other in manufacturing the spectrometer is made unnecessary. The process of manufacturing the spectrometer can thus be facilitated.

[0063] Also, with the present spectrometer, the carrier capturing portion is disposed between the photodiode array 11 and the light entrance portion 13 in the photodetector 1B (see FIG. 3). Thus, even if a portion of the entering light is directly illuminated onto the substrate near the light entrance portion 13, the extraneous carriers that are generated are captured by the carrier capturing portion, thereby enabling the spectral components of the light spectrally separated by the diffraction grating 24 to be detected satisfactorily by photodiodes 12.

[0064] Also, the spectrometer shown in FIG. 6 is arranged by installing the main body 2, provided with the diffraction grating 24, which is the dispersive element,

onto the substrate 10 of the photodetector 1B provided with the photodiode array 11 and the light entrance portion 13. With such a spectrometer, the arrangement of the spectrometer can be made compact as a whole by the on-chip structure.

[0065] However, the arrangement of the spectrometer may be that in which such a main body 2 is not used. In general, it is sufficient for a spectrometer to be arranged, in addition to the photodetector of the above-described arrangement, with a spectroscopic optical system that includes a dispersive element that is positioned, with respect to the photodetector, at a predetermined position along an optical path from the light entrance portion to the photodetecting element array.

[0066] Also, with the present embodiment, the photodetector 1B and the main body 2 are positioned and fixed by the fitting of the openings, which are detector side positioning portions 14 and 15, with the protrusions, which are main body side positioning portions 21a and 22a. With such an arrangement, with which positioning portions are provided in both the photodetector 1B and the main body 2, positioning by passive alignment is enabled in the process of manufacturing the spectrometer, and the manufacture of the spectrometer is facilitated further. Also, because by the photodetector 1B and the main body 2, the respective components of the spectrometer are positioned with good precision three-dimensionally, a chip-size spectrometer, with which complete self-alignment is possible, can be realized.

CONCLUSION

In view of the foregoing, Applicants submit that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response; the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution. A favorable action is awaited.


If there are any other fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-0573. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

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